

## BASIC SCIENCE AND THE FUTURE OF ORTHOPSYCHIATRY\*

REGINALD S. LOURIE, M.D.

*Director, Department of Psychiatry, Children's Hospital, Washington, D. C.*

**S**UPPOSE you were manufacturing horse buggies and you heard that some people were developing a gasoline motor. It would be a moment to sit down and think about the future of your business. Some choice would eventually have to be made about whether to stand around and yell "Get a horse," or to see how the motor could be applied to the basic vehicle. This seems to be the problem that orthopsychiatry is facing, with the signals ahead indicating that at least some changes will need to be made in our functioning. We are a working group that has been concerned with psychological, social and cultural approaches in our clinical settings, but the basic sciences, especially neurophysiology, neurochemistry, and genetics, are bringing out new findings that have profound implications for our patterns of professional work in the future. They point in the direction of our having available biological approaches that we shall need to incorporate into the work of the clinical team.

The concepts behind the changes that are coming are not new. From antiquity the most forward thinkers in the development of our current basis of clinical functioning were convinced that the ultimate answers to human behavior would have to include more definite knowledge of how the brain works. Freud, himself accomplished in the basic sciences, while giving the psychodynamic approach the greatest impetus and status it has ever had, indicated that the definite answers to mental functioning would be found via biological studies.

However, not all these potential changes in our clinical team operations are in the future. Some of them are on our doorstep. We only have to look at the program of this meeting to see where the changes will need to be made. Sessions on new drugs, the future of psychoanalysis in light of the advances in biochemistry, and the diagnosis and management of brain-damaged children are some of the loads that threaten to mire the horse and buggy.

The dilemma we are currently in would seem to be highlighted by the problems brain-damaged children pose, and therefore a more detailed description of what is involved in dealing with them would seem appropriate. The problem of the brain-damaged child was highlighted at a recent luncheon discussion with some of my medical colleagues. The obstetrician in the group said, "Isn't it a paradox that a psychoanalyst is dealing with an or-

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ganic problem?" The neurologist said, "Next thing you know you'll be having EEG leads hooked up on the couch." The pediatrician said, "Freud would turn over in his grave—if you would only learn something about antibiotics you can take over my field too." While the badinage was friendly, it was apparent to the group that the child had been referred to our clinic as a last resort for help. As they talked further, however, it emerged that this problem of organic brain damage was an increasing problem in children. Particularly the incidence of children with mild degrees of brain damage has been growing in the experience of a number of clinics. Then my colleagues came up with the realization that this was a problem they and their fellow obstetricians, pediatricians and neurologists were creating.

Much as the current focus is on the dangers of genetic change from fallout and radiation, the noncontroversial, observable facts that we are overlooking are that we are having to deal with more brain-damaged children now because we are saving more babies at birth. Which are the babies saved by obstetrics and pediatrics? Many of them are babies with one degree or another of brain damage or with conditions such as anoxia or subdural hematoma which end in brain damage if not corrected by the heroic approaches—rapid resuscitation, exchange transfusions, etc. Meningitis and encephalitis, which used to be 90 to 100 per cent fatal, are now 90 to 100 per cent curable with our antibiotics. However, roughly 50 per cent of those who recover have residua which often are in the form of brain damage. Thus an increasing number of these children are and will be turning up on our doorsteps. This is an example of why it becomes necessary for us to look for help with these patients from the basic scientists who are trying to better define the structure and function of the brain.

But why are the brain-damaged children on our waiting lists and not in our colleagues' offices? After all, the damage is to brain tissue and the manifestations are in the form of disturbances in perception or development of skills. Our psychologists call them visual motor distortions, disturbances in spatial perception or form perception, word deafness, expressive aphasia, motor incoordination, easy disorganization of thinking, etc., with or without involvement of intelligence. However, these aren't the reasons they come to our clinics in increasing numbers. They come with relationship problems. Some are even called autistic or schizophrenic, or they can't communicate properly, or they are overactive and destructive or fearful and can't be trained properly, have temper tantrums or are resistive and stubborn.

When our clinical teams look into these problems we find that one of the greatest hazards these children encounter is in achieving normal personality patterns. From the very beginning of ego development the timetable of the stages of development is distorted in these children. They need to be dependent for much longer because of the very nature of their structural difficul-

ties and the resulting handicaps even if mild, as they often are. In fact, the milder and less typical the handicap, the less the need of the child for dependency may be recognized unless the parents are "tuned into" the child's functioning. If the child finds out that it can't have its dependency needs met, it may give up trying and turn away from people, or become depressed. Then these children have special problems about separation—not only is their anxiety harder for them to come to peace with, but often it too is prolonged. Such a child is like a baseball player who has walked, not run, to first base, takes a lead to second, but encounters some possible danger and scoots back to first base. Suppose when he gets there, first base as he knows it is gone. He gets panicked and looks around frantically for a safe base. If he finds one he will stay on it until he feels very, very safe. He may, however, go back to home plate and give up the game. The brain-damaged child thus finds it harder to deal with separation problems, which show up in many ways.

We can go through the stages of personality development and point out how these children have more difficulty in solving them or continue to remain preoccupied with them. For example, the usual fears of body hurt are much realer to this group; many of them do get hurt more than their normal brothers and sisters.

We are becoming aware of a group of infants with special sensitivities evident from birth which may or may not result from "holes in the brain." Sometimes they are transitory and constitutionally determined, possibly in the nature of developmental delays. They may show up, for example, in the form of tactile hypersensitivity or auditory hypersensitivity. These, if properly handled, may be transitory, but if not understood may continue to be exaggerated. If a baby when touched experiences it as pain, how can its mother cuddle it and hold it to feed it as she is instructed? How easy it is for this mother to end up as the rejected, frustrated member of the nursing pair and how easy it is for us to say, when we look at this much later, that this was a rejecting mother! How much harder it is for such a child to learn to trust.

Another variety of disturbances based on the organic changes or constitutional make-up in which we need help *now* from the neurophysiologists and neurochemists, is the group of impulse disorders. These are the children with either an overdose of instinctual drive or poor control systems or both. They can get their motors racing very easily, as William S. Langford describes them, and then they may have poor brakes with which to stop themselves. We call them hyperactive, impulsive, distractible, aggressive or destructive behavior problems. Actually, they are helpless children. They need brakes applied from the outside. If the parents are also helpless or indifferent, or unavailable on any basis, the child's helplessness shows up clinically.

In other words, when we launch a personality in the course of ego development with a distortion in one of its organically based functions, one or more forms of perception, the other ego functions suffer in turn as they emerge. Like a chain reaction, object relationships, autonomous and synthetic functions of the ego, as well as defense mechanisms, etc., are distorted. As an example, there seems to be in some of these children difficulty in translating symbols into reality. Fantasies cannot be differentiated from reality for much longer than is usual.

The end result is seen clinically as the child's inability to tolerate anxiety. The ability to tolerate anxiety seems to be basically constitutional in origin and is complemented by cultural patterns, defenses and life experiences. This is probably true in most of our patients but is particularly true in these brain-damaged children. Sometimes we can see how the biological defects influence the other factors of development right under our eyes. Sometimes we can see directly in the playroom such phenomena as disorganization of thinking or of speech or of motor activity. Sometimes the psychologist is in the best position to see it as anxiety comes into the testing picture.

When we add all this up we can see why these children are in our offices. It is as though lightning struck and did its damage to the foundation of the ego. No matter whether the damage results in spasticity, flaccidity, paralysis or convulsive disorder, or in none of these, the personality structure that is built on this weaker foundation is the responsibility of the clinical team. We see in these children symptoms resulting from anxiety based on structural difficulties as well as the more usual sources for anxiety. We cannot properly help them in the complex interaction with parents and peers, with their body image problems, their fears and their special needs, and their learning problems, without knowing more about the nature of the structure and how it works.

When we turn to our basic scientists in the field of mental functioning and ask them how we can understand the problem of the brain-damaged child's symptoms in terms of structure, they don't always know what we're talking about. We don't speak the same language. Some of them see us as we see the brain-damaged child, talking in symbolic language about areas of functioning where we work under handicapping conditions, with tools of relatively little precision and with which we can perceive relatively indistinctly.

They in turn talk in language that is strange to us as a way of describing mental functioning. They talk in terms of feedback, reverberating circuits and atomistic phenomena, as well as enzymes, chemical components of cells related to memory, and other terms borrowed from physics and chemistry. Where we use the same words, we get to have even poorer communication—energy and activity, for example, convey different concepts to each group.

At this point we need more people who talk both languages. There are a few such people on the program for this meeting. Dr. David Rioch is married to an eminent clinical psychologist. Dr. Ralph Gerard was married to an outstanding child analyst. However, I doubt that the ultimate answer to the problem of better communication between clinicians and basic scientists will be found in the institution of marriage. The communication problem seems rather to be related to a subject we are concerned with in some of our other sessions, the problem of segregation. There are a few integrated places which train scientists where the barriers are broken down without the blessing of the Supreme Court. But even where there is being developed this new generation, trained in both fields, they still are being trained in two languages. Also, there are still some of our most highly regarded institutions where clinicians and basic scientists work close to each other but where they are still multidisciplinary, rather than interdisciplinary in functioning as is the rule in orthopsychiatric settings.

Accepting for the moment the reality of these communication problems, suppose we go to the neurophysiologist, neurochemist, and neuropharmacologist and ask them about help with understanding these brain-damaged children in constitutional terms. The neurophysiologists say that theories about cybernetics will plausibly explain many things about such phenomena as aphasias. This can be useful because given a concept such as feed-back and reverberating systems, we can construct systems for training our aphasic patients, using techniques similar to feedback. But they say, "We can't really tell you yet about extrasensitivities or what is involved in the inability to tolerate anxiety."

The neurochemists point to Linus Pauling and a host of others and say, "We are working on it." Then they talk about changes in brain metabolic patterns tied to enzymes, amino acids and endocrine derivatives. But no, they don't have any answer to our prime question, "What is involved in the inability to tolerate anxiety?"

The neuropharmacologist tells us about tranquilizing drugs and their tremendous impact on our field, although many of us who work mostly with children haven't felt it as much as our co-workers in the adult field. This may or may not be of some help to the brain-damaged child. At this point we finally get an answer that gets closer to our primary problem about tolerance to anxiety. Where the tranquilizers do work in these children, it relieves their anxiety. However, there is no answer yet to the question of whether it deals with the basic ability of the individual to tolerate anxiety, possibly by helping the ego to deal with the anxiety. Some think it diminishes the anxiety itself instead.

However fragmentary their current answers are to specific clinical problems such as the ones we have used as examples, our basic science colleagues

go on to tell us fascinating things they are doing that indicate to us that we had better do some looking ahead for ourselves. They say essentially, we are slowly building a gasoline motor to hook on to your buggy.

If we listen, the neurophysiologists (teamed with physicists) will tell us of appetite centers in the hypothalamus and pleasure centers in the reticular formation. Lilly has monkeys with electrodes implanted into the pleasure area who will stimulate this area all day long in preference to doing anything else, even activities important to existence. We can't use this information clinically yet, but we can suspect that there will be a day when in treating obesity or addictions we shall be able to use this knowledge—as when the gasoline motor was developed, the first auto makers had to find ways for the motor to be applied to actually making the buggy move. Now, how to stop the motorized buggy? To do this brakes had to be developed. Here too, the neurophysiologists have made steps toward an answer. They have found brain centers which when stimulated will extinguish appetite, and centers which will similarly cause depression.

When we tune in on the neurochemists we hear that they are carrying on along the same front. They are doing this in the New Deal tradition by classifying their reagents like government agencies. They talk of DMAE, DNA, LSD and HIAA. With it all they too are getting much closer to better definition of the origins of the forces in the organism. One neurochemist has been able to reproduce DNA (known officially as desoxyribonucleic acid), which is thought to be that chemical component of the cell nucleus responsible for memory. If we can solve the problem of the cell's memory, we shall be closer to knowing how it perpetuates itself in such repetitive ways, even to perpetuating changes for good or bad in make-up induced by radiation, for example. It is in the inherited memory of the cell that the instincts may reside as well as the archaic patterns and memories that have been postulated as influencing the thinking of the whole individual, i.e., the composite group of cells making up the individual. We are hearing then about the first steps in defining this memory faculty.

The neurochemists talk about having learned how the enzymes are involved in the production of sphingosine which disappears in the demyelinating diseases of the brain. Thus, they are on the way to being able to correct the errors of metabolism leading to blindness, mental deficiencies and death.

Janet predicted many years ago that the chemist will solve dementia praecox. The neurochemists seem to be on the road to one part of the solution. We hear about adrenochrome, adrenolutin, ceruloplasmin, serotonin and taraxein, all of them important as psychotogenic agents or related to the presence of psychosis. We thus inch along in determining this facet of what goes into the defenses against anxiety (our clinical bread and butter) and what overwhelms them.

The new tranquilizing drugs haven't produced the masses of cures that were promised. However, they are here to stay. It is suspected that possibly their greatest value will come from their aid in delineating the intermediate metabolism of the brain.

We can argue with the neurophysiologists and the neurochemists that symbolic thinking or primary process thinking which influences the individual's acts and words is established on the basis of early childhood experience as well as later experience. This can't be measured in specific groups of neurons and pathways. However, we postulate that there is some area or pattern in brain organization that translates primary process thinking out of material that dreams are made of, and into words that deal with reality and concepts that are conscious. We can postulate that this takes place in a translating center or a kind of transcribing center which, because we have no better delineation of it in terms of brain structure, we call the preconscious. Where is this group of functions located? Edwin A. Weinstein and David McK. Rioch ("Consciousness and Chemical Environment of the Brain," 1958) have described the types of changes that take place when the cortex or centrencephalic system is damaged, but this doesn't hold for children. The difference has been likened to the difference between taking a brick out of an already established foundation and leaving a brick out when the foundation is being built. When the basic scientists can tell us about what goes into that, we can possibly be of more help to these brain-damaged children, these children in whom it is this area of function that is damaged, so that when they talk it is in symbols. We shall always have to function in relation to the symbolic thinking of patients when it is inappropriate or too scary to the child, but we can also use some help that allows us to understand how to speed up the process of translation.

I am reminded of the old story of the man who played the bass viol in the Metropolitan Opera Orchestra. After thirty years he retired, having trained his son to take his place. He sat enthralled in the audience for his son's first appearance, and at the end of the first act rushed to the orchestra pit. He said excitedly, "Do you know that when you play zum, zum, zum, out there it comes out a magnificent aria?" The brain-damaged children with this difficulty in translation of symbols into everyday language can bring out only the zum, zum, zum for us to hear. In analyzing this we might speculate on the role of the conductor in the child's brain that is not integrating all the other instruments with the bass viol. We are like blind listeners who can't tell that it is the conductor that is missing or not conducting properly. If someone with exploring vision identifies the conductor for us we might figure out ways of training a new conductor or retraining this one better.

It wasn't always this way, where we look to the basic scientist and hope for answers that will help us. The psychodynamicists went through a period in which they went to the biologists and said that they had the answers. In

the 1920's and the 1930's papers were appearing interpreting the activities of body cells in terms of personality patterns. Inflammatory swelling was described by S. Pfeifer (*Imago*, 1926) as being of narcissistic character, later assuming a genital character. Phagocytes were said to be expressing sadistic tendencies. L. R. Delves Broughton (*Imago*, 1927) talked about bees in terms of anal-erotic character because they were so clean and such hoarders. This was met by a wave of such skepticism that it made the distance between the basic scientist and the clinician even greater. However, a more realistic picture of the role of cells has been emerging with the development of tissue culture.

As an old cytologist, I too deplored this approach of ascribing to the "thinking" of the cell, patterns of the mind. But I began to think about what really happens to cells under stress of unfavorable conditions. They may die, they may multiply or they may change form. These are known and demonstrable facts. What isn't known is just what makes the difference in choosing which of these three usual solutions a harassed cell will adopt. Then a tissue culture laboratory was set up in our hospital, not too far from my office. It's a bad situation for an old cytologist to have canceled hours and a tissue culture laboratory nearby. It ended with my becoming more convinced than before (as many have been convinced before me) that many answers about my patients will come from study of the cell, though probably not by me. When one studies these cells, from whatever tissue, it is clear that they have individual lives with individual reactions. As individuals they compete with each other, get pushed around by each other, and either persist in a path or give way. Some cells will seem to studiously avoid becoming a part of a group of cells. Others seem to run to join the group if they get at all close to it. Once an individual joins the group it seems to drop its behavior patterns that it had when it was foot-loose and, we assume, fancy-free. It functions then only as part of the group, with apparently little if any desire to function again as an individual.

In other words, I am naïve enough to believe that the cell has a psychology on what seems to be a primitive level. Moreover, can the psychological responses of the cell give us any picture as a prototype of the defensive mechanism of the whole organism? Is death, multiplication or change of form also defensive in nature? Will we need to know about the cell not only its chemistry, physiology as related to behavior, memory, instincts and sources of energy, but also must these be correlated with individual differences and patterns of behavior? We see that we raise many more questions than we can answer, whether we work from the top down or the bottom up, from the whole organism to an understanding of its parts, or from the smallest units to help us understand the whole.

Thus we see that there are problems of the future already at our clinic doors in the form of the brain-injured child. We can see at the same time



the promise of new microscopic and macroscopic approaches to understanding these children and our other patients in more definitive terms of structure and function. Does this mean that we shall also have to look forward to a change in our patterns of professional work?

What can we look forward to for the work of the clinical team in light of the promises of the basic scientists for the future? A Rogerian view—Buck Rogers, that is—might have one team member mapping out, by testing where in the brain the pathology is; then calculation of the type and dosage of stimulation necessary to provide for the areas affected. While the patient is on the couch the new member of the team, the neurophysiologist, presses the buttons while another team member, possibly the psychiatrist, recites the proper formula that this patient is supposed to hear. Thought control would thus be the order of the day. The social worker would no longer be concerned with the intake, because in neurophysiological, electronic terms this is now what would be transpiring on the couch. Rather she would have prepared, according to the cultural and social background, and according to the standards established by the appropriate standard-setting organizations, the proper formula of thoughts, sexual and aggressive, that is individualized for this patient. If this is not completely effective, cell washing (a refinement worked out by Chinese scientists) would be tried by the use of relationship therapy, that is, by the change of the relationship of chemical constituents of the cell to each other. Finally, we might have to resort to replacement therapy, replacement of specific areas of damaged brain tissue from a frozen brain tissue bank where traded-in hypothalamic areas, for example, are reconditioned and reused.

Actually I feel there will be little change in our format of basic functioning. We can accommodate to the new findings that are being made by incorporating them into our present functioning. However, we must already have more provision for the inclusion of the brain-damaged child and the other constitutionally determined problems. We shall need to have more involvement with the tranquilizing drugs. While the promised exodus from the mental hospitals as a result of treatment with these drugs hasn't eventuated, there is a significant number of patients discharged from hospitals on tranquilizers. These patients often can function in the community if outpatient mental health services are available to them. Thus they become the clinical team's responsibility. But no matter how much specific help is available for the relief of the constitutional basis for the lack of tolerance for anxiety, there would seem to be no substitute for prevention of patterns that would lead to too much anxiety. Once anxiety is there we shall always need to work psychotherapeutically with the symbolic and repressive patterns that keep the anxiety level high in the first place. This will always be the clinical team's job.

What can we do to prepare ourselves, therefore, to incorporate into our

therapeutic approaches the new information that our basic science colleagues show promise of producing?

1. We must clarify our communication patterns. This is a big order for a group like ours which finds it hard oftentimes to agree on our own nomenclature. We must be willing to discard the obsolete, and not educate our trainees solely in a perpetuation of our old vocabularies. The objection to this kind of change very often comes from psychodynamically oriented settings which do not realize how modifiable Freud himself felt that his ways of describing the phenomena he found were. He changed his concept, for example, of psychologically based drives to one of forces, somatically based, underlying the drives. As Jeanne Lampl-De Groot points out (*International Journal of Psycho-Analysis*, 1956), he repeatedly emphasized that chemical processes were underlying sexual forces. In fact he went further than some somaticists today when he postulated that the constitution determines the individual's characteristic response to anxiety, whether it is, for example, hysterical or compulsive character patterns that predominate in an individual. The newer findings in neurophysiology may need to bring attention again to Freud's statement that the drive theory is only an auxiliary construction which will not be adhered to any longer than it proves to be useful. The days of usefulness of his terminology will be numbered when we can pinpoint the origin of the forces and control them. Thus, he was prepared long ago for resolving the semantic differences with our biologically oriented co-workers.

2. Another way for us to clarify our own concepts in light of the new findings is to include in our training programs information as to brain structure, brain physiology and brain chemistry. This does not have to be in detailed terms for social workers, sociologists and anthropologists, for example; but they should have an orientation in these subjects comparable to their training in medical information, about how the other organ systems of the body work. In other words, if we are as a team ever to look under the hood of the motorized buggy to see what has gone wrong, we all ought to have some idea of what is under the hood, and not have members of the team who can only know about the fuel system, the fenders and the wheels.

3. Can we make a place for the basic scientist to work as part of our team, at least for periods of time? This would not be only a one-way street for us, in which all the benefits accrue to us with respect to learning more about how the brain works. We have something to teach the basic scientists also, at the same time that they can teach us more about structure, function and the wonderfully precise tools with which they work. We in orthopsychiatry have had more than 35 years of experience with interdisciplinary teamwork. This is not yet effective in the basic research field,

where the patterns are those of multidisciplinary research in contrast to truer interdisciplinary approaches.

4. We should guard our own interdisciplinary functioning so that we do not lose sight of the unique contributions of each of our fields. The danger otherwise is that our functioning gets to be at the lowest level where there is found a common denominator.

5. We must encourage new explorations and not choke off speculations, guesses and hunches. It is out of such approaches that our science grows. At the same time we should cultivate our observational abilities to evaluate new directions indicated to us, and be flexible enough to test them adequately. As Schilder pointed out, "If an idea sounds good it has a good chance of being right." However, this doesn't mean that we should go off on tangents or be lured by wonderful sounding but unproved premises that can so easily become fashionable just because they are treated in accordance with the White Queen's statement to Alice, "Sometimes I've believed as many as six impossible things before breakfast." The exploration of new hypotheses may open many otherwise closed doors, but we must recognize that most of them will have to be closed again.

Let us not be like the mule!